



X-Plain™

Hypoglycemia

Reference Summary

Hypoglycemia is a condition that causes blood sugar level to drop dangerously low. It mostly shows up in diabetic patients who take insulin. When recognized early, hypoglycemia can be treated successfully.

This reference summary will help you understand what hypoglycemia is, how to recognize its symptoms, and what can be done to prevent and treat it.

Blood Sugar

The body needs energy to function. The food we eat fuels our bodies. After digestion, some of the food is transformed into a sugar called glucose.

Glucose is the body's main fuel; all functions in the body need glucose, especially brain functions. The brain can become damaged very fast if it does not receive enough glucose.

Food that contains sugar and starches is called *carbohydrates*. The body gets most of its glucose from carbohydrates, including

- bread
- potatoes
- rice

We eat other kinds of sugars in addition to carbohydrates. Examples of these include

- fructose, mostly in fruits
- lactose, mostly in milk
- galactose

During digestion, glucose is absorbed into the blood stream, which carries it to every cell in the body. Unused glucose is stored in the liver as a substance called glycogen.

The level of sugar in the blood is measured in milligram of glucose per deciliter. The normal range for blood sugar is about 60-120 mg/dL, depending on when the person being tested last ate.

If the person is fasting, their blood sugar could fall below 60 mg/dL and not indicate a serious abnormality or disease. Blood sugar levels below 45 mg/dL usually indicate disease.

Hormones control blood sugar levels. Hormones, made by glands, flow in the bloodstream and control bodily functions. Insulin and glucagon are hormones that regulate blood sugar levels. The pancreas, a gland in the upper abdomen, produces insulin and glucagon. It con-

tains hormone-producing tissue that makes these 2 hormones.



Too much or too little insulin or glucagon can cause blood sugar levels to be abnormally high or low. Low blood sugar is called hypoglycemia and high blood sugar level is called hyperglycemia.

Other hormones affect blood sugar levels, such as cortisol and epinephrine. However, insulin and glucagon are the main hormones that control blood sugar levels.

When blood sugar rises after a meal, cells in the pancreas release insulin. The insulin allows glucose to enter body cells, lowering levels of glucose in the blood to a normal range.

When blood sugar drops too low, other cells of the pancreas secrete glucagon. This signals the liver to release stored glycogen and change it back to glucose, raising

blood sugar levels to the normal range.

Symptoms

Hypoglycemia has specific signs or symptoms. Not everybody experience all or the same symptoms. A person with hypoglycemia may feel

- weak
- drowsy
- confused
- hungry
- dizzy

Other symptoms of hypoglycemia include:

- paleness
- headache
- irritability
- trembling
- sweating
- rapid heartbeat
- a cold clammy feeling

In severe cases, a person with hypoglycemia may lose consciousness or even lapse into a coma.

The symptoms of hypoglycemia are sometimes mistaken for symptoms caused by conditions not related to blood sugar. For example, unusual stress and anxiety can cause symptoms similar to those of hypoglycemia. The symptoms of hypoglycemia are usually relieved right away when the person eats or drinks some sugar.

Causes

The most common cause of hypoglycemia is a complication of diabetes. Diabetes occurs when the body can-

not use glucose for fuel because either the pancreas is not able to make enough insulin or available insulin is not effective. As a result, glucose builds up in the blood instead of getting into body cells.

Diabetics may have hypoglycemia after

- taking too much insulin
 - missing or delaying a meal
 - not eating enough food
 - exercising too strenuously
 - drinking too much alcohol
- Conditions other than diabetes that can lead to hypoglycemia include:
- early pregnancy
 - extended fasting
 - long periods of strenuous exercise
 - patients who exercise while on beta-blocker medications
 - aspirin intake in some children
 - drinking alcohol in some people

Some people have hypoglycemia 2-5 hours after eating foods high in glucose. This condition is called reactive hypoglycemia; it is rare. Those people should follow a healthy eating plan, including avoiding foods high in carbohydrates.

A rare cause of hypoglycemia occurs when the stomach is empty. It usually develops in the early morning right after the person wakes up. This condition is known

as fasting hypoglycemia, it is caused by various factors, and can be hereditary.

Some children develop hypoglycemia because their bodies cannot tolerate fructose. This is called *hereditary fructose intolerance*. Seizures, vomiting, and unconsciousness can indicate an attack of hypoglycemia.

Eliminating fructose from the child's diet is the treatment. Some babies develop hypoglycemia because their bodies cannot use galactose correctly. Galactose is one of the sugars found in milk. A few days after birth, a baby may begin to vomit, lose weight, and develop cataracts. Removing milk from the diet is the usual treatment.

Too little growth hormone causes increased sensitivity to insulin. As the name implies, growth hormone is a very important chemical that causes children and adolescents to grow. Insulin sensitivity occurs because growth hormone usually counteracts some of the effects of insulin in muscle and fat cells.

Children without enough growth hormone sometimes get hypoglycemia. Growth hormones affect the way insulin works. Hormone replacement therapy to treat the lack of growth hormones helps this type of hypoglycemia.

Tumors in the pancreas can affect the production of insulin and or glucagon in the

pancreas. If too much insulin is produced, blood sugar levels decrease causing hypoglycemia. These types of pancreatic tumors are usually benign and can be surgically removed, unlike the more common highly malignant pancreatic cancer. In rare cases, cancer of glands, such as the breast or adrenal glands, can produce extra hormones that act like insulin. This also causes hypoglycemia. Cancerous tumors should be removed if possible.

Diagnosis

To diagnose hypoglycemia in non-diabetics, a doctor looks for 3 conditions.

- The patient has symptoms of hypoglycemia.
- Blood glucose levels are less than 45 mg/dL in a woman or less than 55 mg/dL in a man
- Symptoms are relieved immediately after ingesting sugar.

The doctor will also check for health conditions such as diabetes, obtain a medication history, and decide how severe the symptoms are. Laboratory tests to measure insulin production and levels of C-peptide, a special chemical manufactured by the body with insulin, may also be performed.

Treatment

Doctors and healthcare providers can treat hypoglycemia patients in 3 ways.

- Prevent episodes of hypoglycemia.
- React to episodes of hypoglycemia when they happen.
- Treat any disease causing the hypoglycemia

Hypoglycemia is most common among diabetics. Learning how to manage diabetes is essential to prevent hypoglycemia.

Some tips for diabetics to prevent hypoglycemia include:

- take medication as prescribed
- do not miss or delay a meal
- eat the amount of food prescribed with your insulin dosage
- do not exercise too strenuously
- do not drink very much alcohol

For non-diabetic patients, following healthy diet plans prescribed by the doctor and dietitians can prevent hypoglycemia.

When a patient first notices symptoms of hypoglycemia, he or she should drink juice or other drinks high in sugar. For diabetics, an injectable form of glucagon is often prescribed. A glucagon injection is often given by another person. It quickly eases symptoms of hypoglycemia,

releasing a burst of glucose into the blood.

If, in spite of following the directions of your healthcare provider the symptoms persist, emergency help should be sought within a few minutes. Blood sugar level can be stabilized at a hospital. Treating hypoglycemia depends on the cause. There are many treatment options.

Summary

Hypoglycemia is a condition where blood sugar levels drop dangerously low. It is usually seen in diabetic patients who take insulin, but other diseases can also cause it.

It is important for hypoglycemic patients to be able to recognize the symptoms of hypoglycemia in order to treat them immediately and prevent permanent brain damage.

Several options are available to diagnose and treat hypoglycemia. Most hypoglycemic patients live normal lives by preventing hypoglycemic episodes and treating them when they happen!